No. 743,644. PATENTED NOV. 10, 1903.

T. R. JOHNSON.

FLANGING MACHINE.

APPLICATION FILED FEB. 27, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 4.

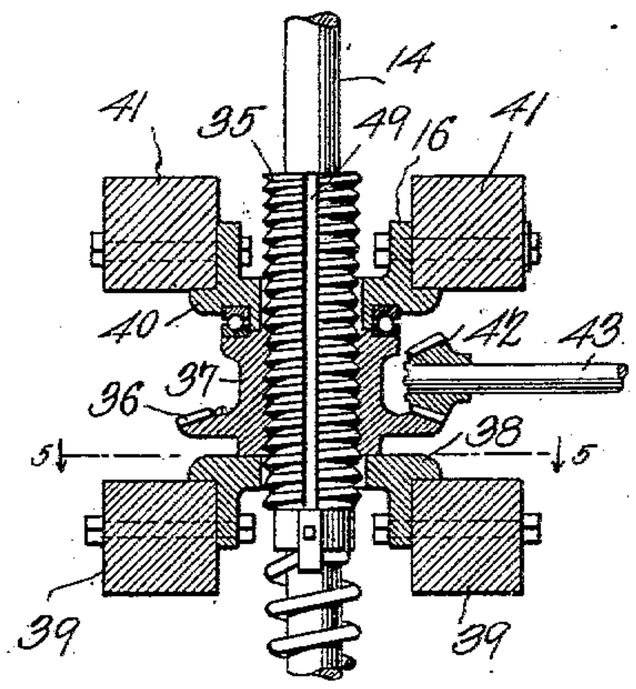


Fig. 5.

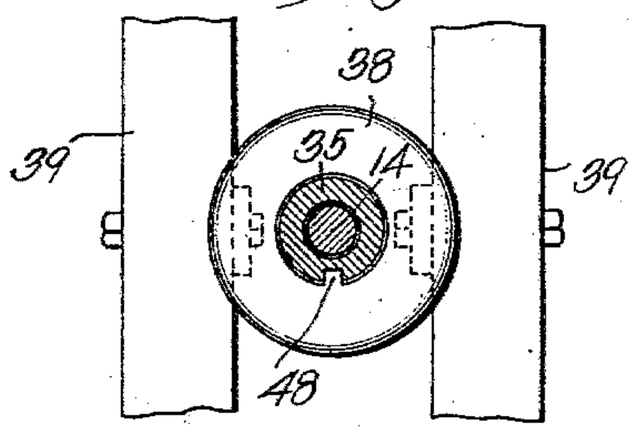
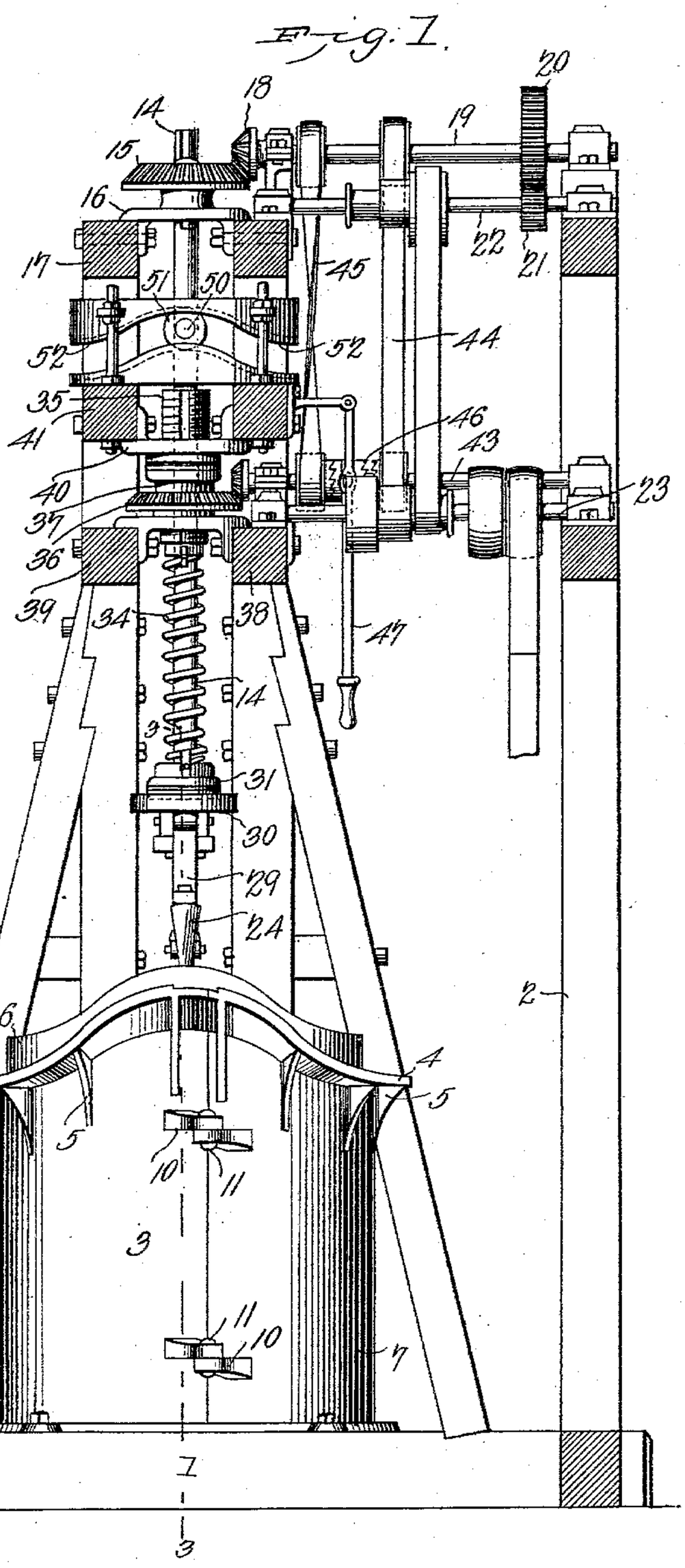


Fig. 1.



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APPLICATION FILED FEB. 27, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

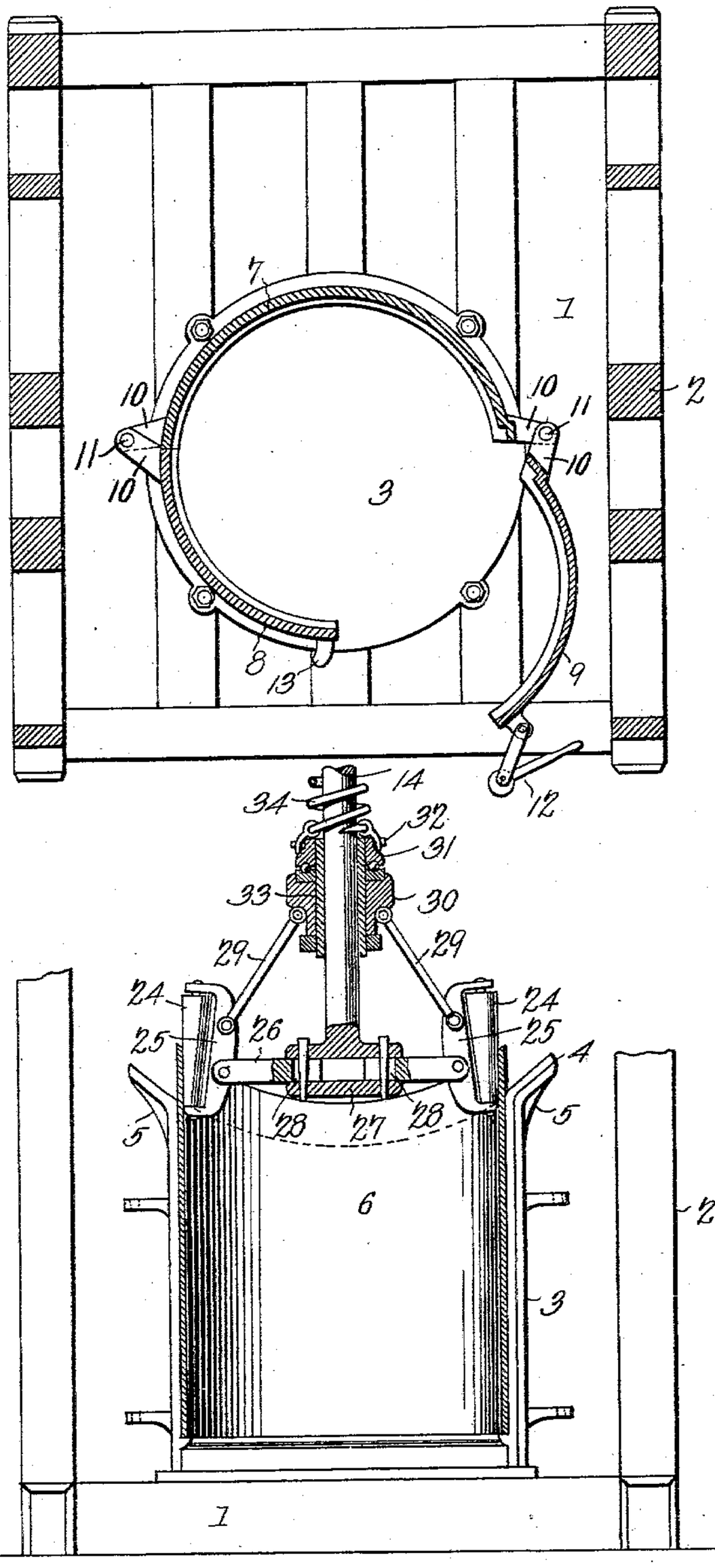

Fig. 3.

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No. 743,644. Patented November 10, 1903.

UNITED STATES PATENT OFFICE.

THOMAS RICHARD JOHNSON, OF JOPLIN, MISSOURI.

FLANGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 743,644, dated November 10, 1903.

Application filed February 27, 1903. Serial No. 145,380. (No model.)

To all whom it may concern:

Be it known that I, THOMAS RICHARD JOHNSON, a citizen of the United States, residing at Joplin, in the county of Jasper and State of Missouri, have invented a new and useful Flanging-Machine, of which the following is a specification.

My invention relates to flanging-machines, and especially to that class of machines which are employed for forming the flanges on the domes of steam-engine boilers, and has for its objects to produce a device of this character which is comparatively simple of construction, efficient in operation, and will efficiently perform its functions and will during the flanging operation automatically adjust itself to follow the contour of the end of the dome which receives the flange.

To these ends the invention comprises the details of construction and combination of parts more fully hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side sectional elevation of my improved flanging-machine. Fig. 2 is a horizontal sectional plan of the dome-receiving die and the supporting-base. Fig. 3 is a vertical transverse sectional elevation on the line 3 3 of Fig. 1. Fig. 4 is an enlarged detailed section. Fig. 5 is a detailed sectional elevation.

Referring to the drawings, 1 indicates a supporting-base which sustains a vertical framework 2, which in turn supports the various parts of the mechanism and its actuating means. The base and framework may be of any suitable or desired material and of any construction which will adapt it for the purposes hereinafter described.

3 is a die, of any suitable material, which has its upper edge turned outward or flanged, as at 4, said flange being supported by bracing-webs 5. The die 3, which in practice receives the dome-blank 6, is composed, preferably, of a fixed section 7, semicircular in cross-section, and two hinged or movable sections 8 and 9, provided with suitable horizontal ears 10, perforated to receive the vertical pivoting-bolts 11, by which they are respectively pivoted to the ears of the fixed section 7. The movable sections, which conjointly compose one vertical half of the die, are adapted to be locked in their closed position by means of a concentric latch member 12, having a suitable actuating-lever and link and adapted to engage with a horizontal latch-lug 13, formed on the section 8. The latch member 12 and its operating-lever are carried by the section 9 and when engaged with the lug 13 may be actuated to draw the parts tightly together to clamp the dome-blank securely in position in the die. In this connection it may be mentioned that the die is removably secured in some suitable manner to the base to permit of ready interchanging of the dies to conform to the varying sizes of the domes which are to be acted upon, and that the upper flange 4 of the dies is formed at an angle corresponding to the angular bend which is to be given to the flange of the dome.

14 indicates a vertical shaft mounted for rotation in suitable bearings sustained by the framework 2, the shaft being arranged concentrically over the die 3 and driven by means of a beveled gear 15, fixed to its upper end, which gear is sustained by a bearing-plate 16, mounted on horizontal beams 17 of the framework, and is in turn driven by a bevel-pinion 18, fixed on a horizontal shaft 19, mounted for rotation in suitable bearings supported by the framework. The shaft 19 is driven by a spur-gear 20 in mesh with a pinion 21 on a horizontal shaft 22 in belt connection with a shaft 23, which latter is in turn in belt connection with and driven by any suitable source of power. (Not shown herein.)

24 indicates a plurality of conical flanging-rollers, each journaled for rotation in a U-shaped frame 25, slidingly connected by a horizontal arm 26 with a suitably-slotted head 27, formed integral with the shaft 14 at its lower end, the arms 26 being slotted, as at 28, and connected by a suitable pin with the head, thus permitting them to slide freely in a horizontal plane during the movement of the rollers 24 while performing the flanging operation, as hereinafter described. The roller-carrying frames 25 are each pivotally connected by a link 29 with a collar 30, slidingly mounted on the shaft 14 and adapted to be reciprocated longitudinally of the same, in the manner presently explained, in order to move the rollers 24 from their normal vertical position to a horizontal position during the opera-

tion of flanging the dome-blanks. The collar 30 has formed in its upper horizontal face a suitable raceway which receives antifriction-balls interposed between the collar and a bearing-block 31, provided with horizontal lugs 32, and mounted on a sleeve 33, which is interposed between the shaft and the collar and bearing-block and preserves the parts from undue wear.

34 is a normally-expanded spring mounted on the shaft 14 and connected at its lower end with the bearing-block 31 by means of suitable straps which engage the lugs 32, and attached at its upper end in a similar manner to the lower end of a tubular externally-threaded sleeve 35, slidingly mounted on the shaft 14 and adapted for reciprocation longitudinally of the same. From this construction it will be seen that when the sleeve 35 is moved downward on the shaft it will increase the tension on the spring 34 and through the medium of the same force the collar 30 downward, which in turn, through the medium of the links 29, will swing the rollers 24 from a vertical to a horizontal position, thus turning the flange on the dome-blank, as will be readily understood, and, further, that the spring will maintain the rollers yieldingly against the flange 4 of the die to permit them to move bodily upward vertically, in the manner presently described, in order to follow the irregular contour of the flanged end of the dome.

The sleeve 35 is positively reciprocated longitudinally of the shaft 14 by means of a bevel-gear 36, formed on a collar 37, internally screw-threaded for engagement with the screw-threads on the sleeve and sustained by a bearing-plate 38, attached in any suitable manner to horizontal beams 39 of the framework. The upper end of the collar is provided with a ball-race, which receives antifriction-balls interposed between the same and an upper bearing-plate 40, bolted or otherwise secured to the horizontal beams 41 of the framework. The purpose of the antifriction-bearings is to prevent excess friction due to the upward pressure of spring 34 on the parts. The collar 37 is rotated through the medium of its gear 36 meshing with a bevel-pinion 42, mounted on a shaft 43, adapted to be driven in opposite directions from the shaft 19 by means of belts 44 and 45 (the latter of which is crossed) engaging with suitable pulleys mounted idly on the shaft and adapted to be respectively clutched to the same, according to the direction the shaft is to be driven, by means of a friction-clutch 46, operated by a lever 47. Thus it will be seen that the collar 37 may be rotated in either direction at the will of the operator for raising and lowering the sleeve 35, with a consequent swinging of the rollers 24 from a vertical to a horizontal position. During the rotation of the collar 37 for reciprocating the sleeve the latter is prevented from rotating by means of a spline 48, formed on the bearing-plate 38, engaging a longitudinal groove 49, formed from end to end of the exterior face of the sleeve.

The end of the dome-blank which receives the flange is of irregular contour due to it being formed to fit the outer cylindrical face of the steam-boiler. Hence instead of the upper flanged end of the die following a true horizontal line it follows a wavy line having two diametrically opposite high portions and diametrically opposite low portions, and in order that the flanging-rollers may in their travel around the flange 4 of the die follow this irregular contour with an equal degree of pressure the shaft 14 is provided near its upper end with horizontally-projecting spindles 50, carrying antifriction-rollers 51, which travel in cam-grooves 52, formed in wave-plates 53, the contour of the cam-grooves being such as to agree with the wavy contour of the dome-flange, so that the shaft 14 will, owing to the rollers traveling in the cam-grooves, be alternately raised and lowered to cause its flanging-rollers 24 to bear with an equal degree of pressure upon the dome-blank while flanging the same, as will be readily understood. In this connection it may be mentioned that the wave-plates are provided with a plurality of the cam-grooves varied in size and contour to conform to the varying standard sizes and contours of boiler-domes.

The general operation of the device is briefly as follows: The blank to be flanged is clamped in the die 3 and motion is imparted to the shaft 14 from shaft 23 through the medium of the intermediate belt-and-gearing connections above described. As the shaft rotates it causes the rollers 24 to travel around the interior of the blank 6, and at the same time the collar 37 is operated through its driving mechanism to move the sleeve 35 downward, which tends to compress the spring 34, thus causing the same to force the collar 30 downward, thus gradually swinging the rollers 24 from their normal vertical position to a horizontal position and bending the blank to form the flange thereon, while at the same time the rollers 51 traveling in the cam-groove 52 positively move the shaft 14 longitudinally back and forth in order that the rollers may, as above described, follow the irregular contour of the flanged end of the dome and bear with an equal pressure throughout their travel over the same. In this connection it is to be noted that the rollers 24 not only gradually turn the flange, thus obviating a liability of rupturing the metal, but also insure the juncture of the same with the body of the dome owing to their action thereon being of a uniform thickness therewith. After the flanging operation is completed the rotation of gear 36 is reversed to cause the sleeve 37 to raise sleeve 35, thus drawing collar 30 upward and returning the flanging-rollers to their normal position to permit removal of the dome-blank from the die.

From the foregoing it will be seen that I

produce a device of comparatively simple construction which is admirably adapted for the attainment of the ends in view and will in practice efficiently perform its function, and it is to be understood that I do not limit or confine myself to the details herein shown and described, inasmuch as various changes such as would suggest themselves to the skilled mechanic may in practice be made therein without departing from the spirit or scope of my invention.

Having thus described my invention, what I claim is—

1. In a flanging-machine, the combination with a blank-holding die, a rotatable shaft, a collar slidingly mounted on the shaft, flanging-rollers pivotally connected with the collar, and yieldable means for reciprocating the collar to move the rollers into and out of flanging position to apply a yielding pressure to the flanging-rollers during the flanging operation.

2. In a flanging-machine, the combination with a blank-holding die, of a rotatable shaft, a collar slidingly mounted on the shaft, flanging-rollers pivotally connected with the collar, and means for reciprocating the collar to move the rollers into and out of flanging position, said means including a sleeve slidingly mounted on the shaft and a spring interposed between the sleeve and collar.

3. In a flanging-machine, the combination with a blank-holding die, of a rotatable shaft, a collar slidingly mounted on the shaft, flanging-rollers pivotally connected with the collar, a threaded sleeve slidingly mounted on the shaft, a spring interposed between the sleeve and collar, an internally-threaded gear engaging the sleeve, and means for rotating the gear in reverse directions to move the flanging-rollers, through the medium of the intermediate connections, into and out of flanging position.

4. In a flanging-machine, the combination with a blank-holding die, of a rotatable shaft carrying pivoted flanging-rollers, means for moving the rollers into and out of flanging position, and means for reciprocating the shaft to cause the rollers to travel in a predetermined irregular plane.

5. In a flanging-machine, the combination with a blank-holding die having its flange-receiving surface following a predetermined irregular plane, of a rotatable shaft carrying pivoted flanging-rollers, means for moving the rollers into and out of flanging position, wave-plates provided with cam-grooves, and rollers connected with the shaft and traveling in the cam-grooves to reciprocate the shaft and cause the line of travel of the flanging-rollers to conform to the irregular plane of the flange-receiving surface of the die.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

THOS. RICHARD JOHNSON.

Witnesses:
HOMER MANSON,
D. H. BALDRIDGE.